EVALUATION ON DESIGN – BUILD PROCUREMENT PROCESS IN CONSTRUCTION INDUSTRY IN MALAYSIA

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SUPERVISOR'S DECLARATION

I hereby declare that I have checked this thesis/project and in my opinion, this thesis/project is adequate in terms of scope and quality for the award of the Bachelor Degree of Civil Engineering

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STUDENT'S DECLARATION

I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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ABSTRAK

Kaedah Rekabentuk dan Membina (DB) adalah pendekatan perolehan bersatu dimana kontraktor yang dipilih akan bertanggungjawab sepenuhnya untuk menjalankan kerja-kerja dan memantau aktiviti projek. Kaedah ini merupakan sebuah sistem di mana klien menjalinkan hubungan kerja secara langsung dengan kontraktor untuk kerja-kerja pembinaan projek dan memainkan peranan penting dalam merekabentuk dan membina projek. Bagaimanapun, DB boleh dipilih melalui dua cara iaitu klien melantik kompeten kontraktor di dalam sebuah organisasi yang sama bagi merekabentuk dan melakukan kerja-kerja membina atau klien melantik konsultan luar untuk membantu kontraktor semasa fasa reka bentuk dan perancangan bagi memastikan kelancaran pelaksanaan projek. Untuk kajian ini, sampel projek yang dipilih adalah projek pembinaan di Malaysia yang melaksanakan kaedah DB. Tujuan kajian ini adalah untuk mengenal pasti masalah atau isu yang wujud di dalam projek pembinaan DB, mencadangkan resolusi untuk mengendalikan dan menguruskan punca isu utama dan juga mencadangkan penyelesaian untuk meningkatkan prestasi keseluruhan projek Design - Build. Untuk mengenal pasti semua masalah dan menilai penyelesaian yang tepat dalam menangani masalah, kajian ini melaksanakan kaedah kuantitatif. Untuk kaedah kuantitatif, borang soal selidik diberikan semasa sesi pengumpulan data kepada responden. Untuk menganalisis dan menjana data yang dikumpul, Analisis Kandungan dan Analisi Purata Index telah digunakan. Dari hasil yang diperoleh, kajian ini mendapati majoriti responden bersetuju bahawa projek mereka berhadapan dengan masalah tenaga kerja yang kurang berpengalaman. Masalah ini mungkin disebabkan oleh perancangan kerja yang tidak cekap atau tidak wajar. Perancangan kerja yang tidak sistematik atau tidak wajar dapat ditingkatkan dengan mewujudkan program master yang dirancang dengan baik yang dapat di praktikkan dan dilaksanakan di tapak pembinaan. Akhirnya, kajian ini mencadangkan Prosedur Pengendalian Piawaian (SOP) yang akan bertindak sebagai panduan kepada pasukan pembinaan agar dapat memperbaiki prestasi keseluruhan projek DB dan mengurangkan masalah utama.

ABSTRACT

Design and Build (DB) delivery method is a united procurement approach where the selected builder will take sole responsibility for all aspects and activities of the project. This method also defined as a system where the clients directly pledge with the contractor to construct the project and play a decisive role to design and construct the project. However, DB can be organized by two ways which are; clients hire a competent design and build contractor in a same company or clients will hire an external consultant to assists the contractor during design and planning phase to ensure the smoothness performance of the project. For this study, the project sample selected is a construction projects in Malaysia that implementing DB method. The purpose of this study is to identify existing problems or issues in DB construction project in Malaysia, propose resolution to handle and manage major issues presence and also suggesting solutions to better improve overall performance of Design - Build project. In order to identify all the problems and evaluate proper solutions to mitigate problems, this study implementing quantitative method. For quantitative method, questionnaire forms are handed out during data collection session to the respondents. To analyze and generate the collected data, Content Analysis and Average Index Analysis are being utilized. From the assembled results, it can be conclude that, most of the respondents agreed that their project deal with inexperience workforce problem. This problem occur may due to the inefficient or improper work planning. Insufficient or improper work planning can be improved by establishing a well - planned master program that are practical and implemented on site. Finally, this study propose a Standard Operating Procedure (SOP) that will act as a guideline to construction teams in order to better improve the overall performance of DB project and reduce major problems.

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LIST OF SYMBOLS

Ai	Constant expressing weight given to i
Xi	Variable that expressing the frequency of degree

LIST OF ABBREVIATIONS

DB	Design – Build
DBB	Design – Bid – Build
CM	Construction Management
CMR	Construction Management at Risk
CMA	Construction Management as Agent
RFP	Request for Proposal
RFQ	Request for Qualification
PPP	Public – Private Partnership
GMP	Guaranteed Maximum Price
SOP	Standard Operating Procedure
AI	Average Index
CPM	Critical Path Method
NCR	Non Conformance Report

CHAPTER 1

INTRODUCTION

1.1 Introduction

Construction Industry is one of the cannonading industries of today that greatly affects the economy of any country. Construction is an imperative segment that contributes enormously in the financial development of a nation. The Construction Industry is a speculation drove segment where government indicates high intrigue. Government contracts with Construction Industry to develop infrastructure related to health, transport as well as education sector. For prosperity of any nation, Construction Industry is quintessential.

The construction industry is viewed as one of the main contributors towards a nation's economy. In Malaysia, the construction industry contributes significantly to the financial development of the nation. In the course of the most recent 20 years, the industry has reliably contributed approximately three to five per cent to the national GDP (Yong & Mustaffa, 2012). To enhance to the growth of the construction industry, (Yong & Mustaffa, 2012) mentioned that an estimated RM 138 billion has been provided for this industry by the Ministry of Works under the Tenth Malaysia Plan (2011-2015). The results of development play an important role towards the production of value way of life among the local population. To put it plainly, every one of us are directly or indirectly influenced by construction procedures and its final results.

In order to increase and boost the growth of construction industry, selecting the right delivery method for procurement is one of the essentials criteria that need to be implemented. Proper delivery methods needed responsibilities, contractual correlations and roles from related organisations in construction projects. Plus, this process usually

takes place when design is completed and constructed to the clients. The project delivery system also can be distinguished based on how the contract is being made between the owners with builders and designers (Touran et al. 2011).

A project delivery system has been defined as the set of relationships, roles and responsibilities of project team members and the sequence of activities required for the organization of a capital project. In the previous study, (Gransberg, Asce, Molenaar, & Asce, 2004) mentioned that project delivery can be viewed as a three-legged stool, with the legs being defined as cost, schedule, and quality.

Procurement method‘s selections act as important role to ensure the projects are followed the objectives which are, time, cost and quality (Yong and Mustaffa, 2012). ―Procurement method‖ is a term that is quite broad in scope because this method needed to acquire several organizations work together to design, build and manage construction projects (Norziatul Husna, 2012). Plus, the presence of procurement also involve on handling and managing people or workers to meet all the requirements by the owners. (Rosli Abdul Rashid, 2006).

There are numerous project delivery methods that owners use on projects such as Traditional Design-Bid-Build, Design-Build, Construction Management and Construction Management at Risk. (El-sayegh, n.d.) has discovered that one of the vital explanations behind the poor performance of construction industry is the unseemliness of the type of delivery system that has been picked. Therefore, selection of any of the delivery systems to utilize may rely upon how well the project could perform under every system.

Procurement method‘s selections act as important role to ensure the projects are followed the objectives which are, time, cost and quality (Yong and Mustaffa, 2012). ―Procurement method‖ is a term that is quite broad in scope because this method needed to acquire several organizations work together to design, build and manage construction projects (Norziatul Husna, 2012). Plus, the presence of procurement also involve on handling and managing people or workers to meet all the requirements by the owners. (Rosli Abdul Rashid, 2006).

Hence, to ensure the effectiveness of the procurement methods, there are two procurement methods that are categorized as most common and predominant project delivery system used in many countries namely as design – bid – build (DBB) and design – build (DB) (Miller et al., 2000; Al Khalil, 2002; Arditi and Lee, 2003; Ling and Kerh, 2004). This method already implemented and documented in 1968 at United States (Plebankiewicz & Zima, 2012). In Malaysia, DB method being introduced and launched by Prime Minister in 1983 in Public Works Department for constructing Kuala Terengganu Hospital which was completed in 1985 (Mokhtar, 1993).

1.2 Background of the Study

Procurement method is a process in a construction industry where all activities that related to construction project including providing materials, services and consultancy that may crucial to the project so that all the client‘s requirements and needs can be accomplished (Martins, 2009; Sears et al., 2008). This method already being implemented not only these recent years, but actually, already done way back before. Back to early years, application of procurement method already implemented as early as 3,000BC. In Egypt, scribes responsible to design the pyramid and used papyrus to record the materials prices that are needed for the pyramid‘s construction. Scribes also responsible as a clerk to observes and calculate all the expenditure for the materials and workforce for the construction. Plus, Ancient Roman also hired scribes as their clerks to make contract during trade – in activity with private suppliers. Besides that, at Great Britain, they are also applying this method back to William the Conqueror, where he wants to ensure the effectiveness way to record the tax transactions. Starts from that occurrence, procurement method starts to widening and influencing all construction projects.

Due to the rapid growth for the construction industries back then, the evolution of procurement system also evolve to a more systematically arrangement. Moreover, this system always changes from time to time to ensure the quality of the project. At first, the procurement method combined the design, maintenance, construction and operation into one, such as Design – Build – Operate (DBO) and Design – Build – Finance – Operate (known as Build – Operate – Transfer). Recently, this combined method already separated into two main categories, which are Design – Bid– Build (DBB) and

REFERENCES

Abdul, I., Universiti, R., & Hussein, T. (2014). PPP Procurement Methods in Malaysian Construction Industry, (January).

Carpenter, N. (2015). Comparison of the design-bid-build and construction manager at risk project delivery methods utilized for the construction of public schools. *Dissertation Abstracts International: Section B: The Sciences and Engineering*, *75*(10–B(E)).

Chen, Q., Xia, B., Jin, Z., Wu, P., & Hu, Y. (2015). Choosing Appropriate Contract Methods for Design-Build Projects. *Journal of Management in Engineering*, *32*(1), 401–5029. https://doi.org/10.1061/(ASCE)ME.1943-5479.0000393

Del Puerto, C. L., Gransberg, D. D., & Shane, J. S. (2008). Comparative Analysis of Owner Goals for Design / Build Projects. *Journal of Management in Engineering*, *24*(January), 32–39.

Fernane, J. D. (2011). Comparison of design-build and design-bid-build performance of public university projects, i-109.

Floor, G., & Area, M. (2009). DESIGN-BID-BUILD (DBB) AND DESIGN-BUILD (DB) PROCUREMENT METHODS IN GHANA By Collins Ameyaw , B . Sc . (Hons .)

Gransberg, D. D., & Molenaar, K. (2004). Analysis of Owner ' s Design and Construction Quality Management Approaches in Design / Build Projects. *Journal of Management in Engineering*, *20*(4), 162–169. https://doi.org/10.1061/(ASCE)0742-597X(2004)20:4(162)

Idoro, G., & Idoro, G. (2012). Comparing levels of use of project plans and performance of traditional contract and design_build construction projects in Nigeria. *Journal of Engineering, Design and Technology*, *10*(1), 7–33. https://doi.org/10.1108/17260531211211863

Meghana, R., Manikandaprabhu, S., & Potti, S. R. (2016). Quality Assessment for DesignBid-Build Projects, (Figure 1), 5724–5729. https://doi.org/10.15680/IJIRSET.2016.0504086

Okunlola Ojo, S., Aina, O., & Yakeen Adeyemi, A. (2011). A comparative analysis of the performance of traditional contracting and design-build procurements on client objectives in Nigeria. *Journal of Civil Engineering and Management*, *17*(2), 227–233. https://doi.org/10.3846/13923730.2011.574449

Palaneeswaran, E., & Kumaraswamy, M. M. (2001). Reinforcing design-build contractor selection: A Hong Kong perspective. *HKIE Transactions Hong Kong Institution of Engineers*, *8*(1), 7–12. https://doi.org/10.1080/1023697X.2001.10667835

Paper, C. (2016). An Assessment of Risk Factors Impacting The Cost of Contractor-Led Design and Build COBRA 2016, (September).

Rahman, N. B. A. (2009). a Survey on Problem Faced By Contractors Using Design & Build Contract.

Turina, N., RadujkoviÄ‡, M., & Car-PušiÄ‡, D. (2008). Design and build" in comparison with the traditional procurement method and the possibility of its application in the Croatian construction industry

Al Khalil, M.I. (2002), ―Selecting the appropriate project delivery method using AHP‖, International Journal of Project Management, Vol. 20 No. 6, pp. 469-474

Akintoye, A. (1994), ―Design and build: a survey of construction contractors‘ views‖, Construction Management and Economics, Vol. 12 No. 2, pp. 155-63.

Yong, Y.C. and Mustaffa, N.E. (2012), ―Analysis of factors critical to construction project success in Malaysia‖, Engineering Construction and Architectural Management, Vol. 19 No. 5, pp. 543-556

Miller, J.B., Garvin, M.J., Ibbs, C.W. and Mahoney, S.E. (2000), ―Toward a new paradigm: simultaneous use of multiple project delivery methods, Journal of Management in Engineering, Vol. 16 No. 3, pp. 58-67.

Arditi, D. and Lee, D.E. (2003), ―Assessing the corporate service quality performance of design-build contractors using quality function deployment‖, Construction Management and Economics, Vol. 21 No. 2, pp. 175-185.

Ling, Y.Y. and Kerh, S.H. (2004), ―Comparing the performance of design-build and designbid-build building projects in Singapore‖, Architectural Science Review, Vol. 47 No. 2, pp. 163-175.

Seng, N. G. W., & Yusof, A. (2006). THE SUCCESS FACTORS OF DESIGN AND BUILD PROCREMENT METHOD : A LITERATURE VISIT, (September), 5–6.

Hale, D. R., Shrestha, P. P., Gibson, G. E., and Migliaccio, G. C. (2009).―Empirical comparison of design/build and design/bid/build project delivery methods.‖ J. Constr. Eng. Manage., 10.1061/(ASCE)CO.1943-7862.0000017, 579–587.

Konchar, M and Sanvido, V. (1998). Comparison of US project delivery systems. Journal of Construction Engineering and Management, 124(6), 435-444.

Hughes, W., Hillebrandt, P.M., Greenwood, D. and Kwawu, W. (2006) *Procurement in the Construction Industry*. Taylor and Francis, London

Ling, Y.Y., Lok, S. and Tan, E.S.M. (2001). Design-build projects: a comparison of views between South Australia and Singapore. In Proceedings of the CIB World Building Congress-Performance in Product and Practice, pp. 349-359. CIB, Wellington

Songer, A.D., Molenaar, K.R. and Robinson, G.D. (1996). Selection factors and success criteria for design-build in the US and UK. Journal of Construction Procurement, 2(2), 69- 82.

Chartered Institute of Building (2010) *A Chartered Institute of Building Report Exploring Procurement in the Construction Industry*, Ascot, UK.

Nurhajar, Abd Rahman (2009) A survey on problem faced by contractors using design and build contract. Faculty of Civil Engineering & Earth Recources, University Malaysia Pahang

Nielsen, K. R. (1994). International Construction Projects - Managing Risk in the Field. Proceedings of World Congress on Construction Risk, Pads, France, April 28-29, 1994, 2.

Design-Build Institute of America (1995). Design-Build RFQ/RFP Guide for Public Sector Projects. Design-Build Institute of America. Washington, D. C.

Cohen, M. W., and Palmer, G. R. (2004). ―Project risk identification and management.‖ AACE Int. Trans., 1013–1015.

Nieto-Morote, A., and Ruz-Vila, F. (2011). ―A fuzzy approach to construction project risk assessment.‖ Int. J. Project Manage., 29(2), 220–231

Wang, T., et al. (2015). ―Enhancing design management by partnering in delivery of international EPC projects: Evidence from Chinese construction companies.‖ J. Constr. Eng. Manage., 142(4), 04015099

Sears, G.A., Sears, S.K., Clough, R.H., 2008. Construction Project Management, fifth ed. John Wiley and Sons, New York.

Frederick E. Gould & Nancy E. Joyce. (2003). Construction Project Management. Prentice Hall.

Ibbs, C.W., Kwak, Y.H., Ng, T. and Odabasi, A.M. (2003), ―Project delivery systems and project change: quantitative analysis‖, Journal of Construction Engineering and Management, Vol. 129 No. 4, pp. 382-7

Idoro, G.I. (2007), ―Comparative study of direct labour and design-tender-construct procurement systems in Nigeria‖, PhD thesis, University of Lagos, Lagos.

I. M. Mahdi and K. Alreshaid. (2005). Decision Support System For Selecting The Proper Project Delivery Method Using Analytical Hierarchy Process (AHP). International Journal of Project Management. [Online]. 23 (7). Pp. 564-572. Available: http://www.sciencedirect.com/science/article/pii/S0263786305000608

S. M. El-Sayegh, ―Significant Factors Affecting the Selection of the Approporiate Project Delivery Method‖, Fifth LACCEI International Latin American and Caribbean Conference for Engineering and Technology (LACCEI‘2007), Tampico, México, 2007

Ibbs,W. C., Kwak, Y.H. , Ng,T., and Odabasi,A. M.. (2003). ―Project delivery systems and project change: Quantitative analysis.‖J. Construc. Eng. Manage., 129 (4), 382-388

S.O. Ojo, O. Aina, A.Y. Adeyemi, A comparative analysis of the performance of traditional contracting and design-build procurements on client objectives in Nigeria, Journal of Civil Engineering and management, 17(2), 227-233, 2011

Adesanya, O. M. 1998. Management contracting and Nigeria‘s industry, Building Quarterly (Arkil-dives Ltd., Nigeria) 1(6): 26–31.

Moore, D. R.; Dainty, A. R. J. 1999. Integrated Project Teams Performance in Managing Unexpected Change Events, Team Performance Management 5(7): 212–222.

Chartered Institute of Building (2010) A Chartered Institute of Building Report Exploring Procurement in the Construction Industry, Ascot, UK.

Ernzen, J. J., and Schexnayder, C. (2000). ―One Company‘s Experience with Design/Build: Labor Cost Risk and Profit Potential‖, Journal of Construction Engineering and Management, 126(1), 10-14

Hemlin, D. (1999), ―Contractor‘s local experience on design & build projects‖, Seminar Proceedings on Design and Build Procurement System, January, Hong Kong, pp. 17-26.

Molenaar, K.R., Songer, A.D. and Barash, M. (1999), ―Public-sector design/build evolution and performance‖, Journal of Management in Engineering, Vol. 15 No. 2, pp. 54-62.

K.R. Molenaar, A.D. Songer, Model for Public-sector design/build project selection, Journal of Construction Engineering and Management, November/December, 467-479, 1998.

A. Kosecki, Construction project management as a service regulated by contract [in Polish], cz.I, Przegląd Budowlany, 3, 36-39, cz.II, Przegląd Budowlany, 4, s. 9-12, 2003.

S. R. THOMAS, C.L. MACKEN, T.H. CHUNG AND I. KIM. Measuring the impacts of the delivery system on project performance design – build and design – bid – build. Construction Industry Institute, Austin, TX, 2002.

Y.Y. LING, AND E.F.K. LEONG. Perfomance of design-build project in terms of cost, quality and time: views of clients, architects and contractor in Singapore. The Australian Journal of Construction Economics and Building, Vol.2, No.1, 2002, pp. 37 -46.

Chan E.H and Chan A.P.C. (2000). Design-Build Contracts in Hong Kong – Some Legal Concerns, Information and Communication in Construction Procurement, Serpell, A (ed.). Pontificia Universidad Catolica de Chile, Chile, 183-200.

Ling, Y.Y., Khee, H.Y. and Lim, K.S.G. (2000). The reasons why owners prefer to procure more projects based on design-bid-build than design- and-build. Journal of Construction Procurement, 6(2), 135-146.

Xia, B., and Chan, A. (2008). ―Review of the design-build market in the People‘s Republic of China.‖ J. Constr. Procurement, 14(2), 108–117.

Hale, D. R., Shrestha, P. P., Gibson, G. E., and Migliaccio, G. C. (2009). ―Empirical comparison of design/build and design/bid/build project delivery methods.‖ J. Constr. Eng. Manage., 10.1061/(ASCE)CO .1943-7862.0000017, 579–587

American Council of Engineering Companies. (2005). ―Project delivery systems owner‘s manual.‖ Washington, DC

Kaplanogu, S. B., and Arditi, D. (2009). ―Pre-project peer reviews in GMP/lump sum contract.‖ Eng. Constr. Archit. Manage., 16(2), 175–185

Molenaar, K. R., Songer, A. D., and Barash, M. (1999). ―Public-sector design/build evolution and performance.‖ J. Manage. Eng., 10.1061/ (ASCE)0742-597X(1999)15:2(54),54–62.

Xia, B., Chan, A., Molenaar, K., and Skitmore, M. (2012a). ―Determining the appropriate proportion of owner-provided design in design-build contracts—A content analysis approach.‖ J. Constr. Eng. Manage., 10.1061/(ASCE)CO.1943-7862.0000522, 1017–1022.

Beard, J., Loukakis, M. C., and Wundram, E. C. (2001). Design-build: Planning through development, McGraw-Hill, New York.

Case Study of Construction Project Delivery Types; William J. Bender; 2007; PhD, PE, M.ASCE; Construction Management Professor, IET Department, 400 East 8th Avenue, Ellensburg

Martinez, P.H., Rashida, Y. and MacMurray V. (2007) ―Construction Manager's Responsibilities: Pre-Design, Design and Pre-Construction Phase‖ American Bar Association January, 58pp

Associated General Contractors of America (AGC) (2004). Project Delivery Systems for Construction, Associated General Contractors of America, Washington, D.C.

Kwakye A. A. (1997), ―Construction Project Administration Practice‖, Longman, First edition, pp 111 – 115

Yu, A.T.W. (1998). Evaluation of integrated procurement systems in Hong Kong, Unpublished MSc Thesis, City University of Hong Kong.

Bubshait, A.A., Farooq, G., Jannadi, O. and Assaf, S.A. (1999). Quality practices in design organizations, Construction Management and Economics, 17(6), p. 799-809

Ng, S.T. and Skitmore, R.M. (2002). Contractors‘ risks in Design, Novate and Construct contracts, International Journal of Project Management, 20(2), 119-126.

Love, P.E.D., Skitmore, M. and Earl, G. (1998). Selecting a Suitable Procurement Method for a Building Project. Construction Management and Economics, 16(2), 221-233.

Chan E.H and Chan A.P.C. (2000). Design-Build Contracts in Hong Kong – Some Legal Concerns, Information and Communication in Construction Procurement, Serpell, A (ed.). Pontificia Universidad Catolica de Chile, Chile, 183-200.

Chan, A.P.C. (2000). Evaluation of enhanced design and build system – a case study of a hospital project, Construction Management and Economics, 18(7), 863-871

Foo, J., Low, C., Goh, B. H., and Ofori, G. (1999). ―Design and Build Procurement of Construction Projects: Hybrids in Singapore‖. In: Profitable partnering in construction procurement, E&FN Spon, 383-392.

Masterman, J. W. E. (2002). An introduction to building procurement systems, E&FN Spon.

Lewis, D. (1999). ―Preparation of Design and Build Contract Documents to Minimize Future Disputes‖, Seminar Proceedings on Design and Build Procurement System, January 1999, Hong Kong, 1-7.

Ling, F. Y. Y., Ofori, G., and Low, S. P. (2000). ―Importance of Design Consultants' Soft Skills in Design/Build Projects‖, Engineering, Construction and Architectural Management, 7(4), 389-398.

Ernzen, J. J., and Schexnayder, C. (2000). ―One Company's Experience with Design/Build: Labor Cost Risk and Profit Potential‖, Journal of Construction Engineering and Management, 126(1), 10-14

Pearson, M., and Skues, D. (1999). ―Control of Projects Implemented through Design and Build Contracts‖, Seminar Proceedings on Design and Build Procurement System, January 1999, Hong Kong, 49-60

Osei-Tutu E., (1999), ―Construction Procurement Decisions in Ghana" unpublished Msc. Thesis, Department of Building Technology, pp.53 – 63

Hong Xiao and David Proverbs (2002), The Performance of Contractors in Japan, the UK and the USA-An Evaluation of Construction Quality‖, International Journal for Quality and Reliability Management, Vol. 19 No. 6, pp. 672-687

Frank Harris and McCaffer, R. (2001), Modern Construction Management‖ 5th edition, Blackwell Science Inc

Best R. and Gerard De Valence (1999), Building in value Pre-Design Issues, Arnold Publishers, pp. 36 – 46

Kenig, M.E. (2011). Project delivery systems for construction. Arlington, VA: The Associated General Contractors of Americas.

Anderson, S.D. and Damnjanovic, I. (2008). *Selection and Evaluation of Alternative Contracting Methods to Accelerate Project Completion*, NCHRP Synthesis 379, Transportation Research Board, Washington, D.C.

Martinez, P.H., Rashida, Y. and MacMurray V. (2007) ―Construction Manager's Responsibilities: Pre-Design, Design and Pre-Construction Phase‖ American Bar Association January, 58pp.

Dunston, P.S., McManus, J.F., and Gambatese, J.A. (2002). *Cost/Benefits of Constructability Reviews*, NCHRPProject 20-07, Task 124, TRB, Washington, D.C.

Kuhn, S. (2007)―Preconstruction Services: Add Value with More than Just Estimating,‖ Construction Business Owner, February

Marks, D. F. & Yardley, L. (2004). Qualitative data collection: interviews and focus groups. In *Research methods for clinical and health psychology* (pp. 39-55). : SAGE Publications Ltd doi: 10.4135/9781849209793.n3

Pierce, R. (2008). Questionnaire surveys. In *Research methods in politics* (pp. 140-160). : SAGE Publications Ltd doi: 10.4135/9780857024589.d15

Dahlberg, L. & McCaig, C. (2010). Quantitative data collection. In Dahlberg, L. & McCaig, C. *Practical research and evaluation : A start-to-finish guide for practitioners* (pp. 172-190). London, : SAGE Publications Ltd doi: 10.4135/9781446268346.n12

Nuhu Braimah & Issaka Ndekugri. (2008). Factors nfluencing the selection of delay analysis methodologies. International Journal of Project Management , 26, 789-799

Henry Odeyinka, Keren Larkin, Robert Eadie & Gervase Cunningham (2016). An Assessment of Risk Factors Impacting the Cost of Contractor-Led Design and Build Projects. The Construction, Building and Real Estate Research Conference of the Royal Institution of Chartered Surveyors

The Construction Management Association of America (2012). AN OWNER'S GUIDE TO PROJECT DELIVERY METHODS CMAA Owner‘s Guide to Project Delivery Methods - August 2012.

Chritamara, S., and Ogunlana, S. O. (2001). ―Problems Experienced on D/B Projects in Thailand‖, Journal of Construction Procurement, 7(1), 73-93.lam

Mo, J. K. W., and Ng, L. Y. (1997). ―Design and Build Procurement Method in Hong Kong - An Overview‖, CIB W92 Symposium Procurement - a key to innovation, University de Montreal, 20-23 May 1997, 453-462.

Corbin, J., & Strauss, A. (2008). Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory (3rd ed.). Thousand Oaks, CA: Sage

Creswell, J. W. (2012). Qualitative inquiry and research design: Choosing among five approaches. SAGE Publications, Incorporated.